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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,180	03/24/2004	Joseph Pierre Heremans	65899-0726	4588
10/29/759008/20/2008 RADER, FISHMAN & GRAUER PLLC 39533 WOODWARD AVENUE SUITE 140 BLOOMFIELD HILLS, MI 48304-0610				
EXAMINER				
SALZMAN, KOURTNEY R				
ART UNIT		PAPER NUMBER		
1795				
MAIL DATE		DELIVERY MODE		
08/20/2008		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/808,180

**Applicant(s)**

HEREMANS ET AL.

**Examiner**

KOURTNEY R. SALZMAN

**Art Unit**

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 21 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 8-25 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Response to Amendment***

1. The Amendment filed February 21, 2008 has been entered and fully considered.
2. Claims 1-7 have been fully considered.

***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1-3, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over SUZUKI et al (US PG PUB 2002/0026856 A1).

Regarding claims 1-3, SUZUKI et al teaches a thermoelectric material with a particle size of 0.5-100 nanometers in the abstract. SUZUKI et al further defines a thermoelectric material as being PbTe in paragraph 4. Since this is the same material as required by the instant application, it would inherently have the same phonon-limited mean free path, as it should be comparable for similar matrix material of a similar size. It would be obvious for the thermoelectric material of SUZUKI et al to inherently have the same mean free path as that of the instant application because they are the same material having the same grain size.

Regarding claim 5, in conjunction with the previous rejection of claim 1, SUZUKI et al also teaches, in paragraph 4, a thermoelectric material to be Bi<sub>2</sub>Te<sub>3</sub>. Paragraph 16 also discloses the use of the thermoelectric material also being present with their solid solutions.

Regarding claim 7, in conjunction with the previous rejection of claim 1, SUZUKI et al teaches a thermoelectric material of particle size .5-100 nanometers, in the abstract.

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over SUZUKI et al (US 2002/0026856) in view of KUDMAN et al (US 3,737,345)

SUZUKI et al teaches all the limitations of claim 1.

SUZUKI et al fails to teach any of the materials listed in the instant application.

Regarding claim 4, in conjunction with the previous rejection of claim 1, KUDMAN et al teaches a thermoelectric element comprising, "a body of PbTe and/or PbSe". (column 1, lines 45-47)

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the PbSe material disclosed in KUDMAN et al to make the thermoelectric material of SUZUKI et al, because KUDMAN et al discloses the benefits of the PbSe materials. In column 1, lines 14-19, KUDMAN et al teaches, "Among the most efficient thermoelectric elements for the thermoelectric generation of power at temperatures above 200°C are thermoelectric elements

comprising PbTe (lead telluride) and/or PbSe (lead selenide)". The efficiency of this material as disclosed in KUDMAN et al make the use of them in the thermoelectric material of SUZUKI et al an obvious choice in the art.

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over SUZUKI et al, in view of SHARP (US 6,169,245).

SUZUKI et al teaches all the limitations of claim 1.

SUZUKI et al fails to explicitly teach the use of BiSb as a thermoelectric material.

SHARP teaches the use of thermoelectric materials including ternary penta telluride and selenide compounds. SHARP acknowledges, in column 2, lines 33-36, the use of BiSb as a thermoelectric material.

At the time of invention, it would have been obvious to one of ordinary skill in the art to use a BiSb material, as disclosed in SHARP et al, as the thermoelectric material of SUZUKI et al because SHARP et al discloses the use of BiSb as a thermoelectric material known in the art for "thirty or forty years ago", in column 2, lines 33-34. The fact that the BiSb material is established and well known in the art for its thermoelectric capabilities, makes the addition of the BiSb material as disclosed in SHARP and obvious choice as a thermoelectric material as in SUZUKI et al, for its commonly known use in the art.

***Response to Arguments***

7. Applicant's arguments, see page 6, second paragraph, filed February 21, 2008, with respect to the interpretation of the phonon-limited mean free path have been fully considered and are persuasive. The 102 and 103 rejections of claims 1-7 has been withdrawn.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KOURTNEY R. SALZMAN whose telephone number is (571)270-5117. The examiner can normally be reached on Monday to Thursday 6:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

krs  
8/14/2008

/Kaj K Olsen/

Primary Examiner, Art Unit 1795